THIS SERVICE BULLETIN IS FAA APPROVED FOR ENGINEERING DESIGN.

SUBJECT: MOONEY TLS, M20M, INCREASED TAKEOFF WEIGHT RETROFIT

MODEL S/N AFFECTED: MOONEY MODEL M20M, S/N 27-0001 THRU 27-0052

TIME OF COMPLIANCE: AT OWNERS DISCRETION BUT MANDATORY IF AIRCRAFT IS TO BE FLOWN AT A TAKEOFF WEIGHT ABOVE 3200 POUNDS.

INTRODUCTION:
Some aircraft owners have expressed a desire to increase the useful load of the M20M aircraft. Mooney Aircraft Corporation is offering the retrofit procedures of this Service Bulletin to accomplish this. There are several areas that will be modified in order for the aircraft to be flown at the increased takeoff weight of 3368 pounds. It is recommended that the aircraft be brought back to Mooney Aircraft Corporation for the retrofit. Scheduling of the retrofit action will be co-ordinated by the Product Support Department, telephone (512) 896-6000.

INSTRUCTIONS:

1. Remove and replace the Main Landing retraction truss assembly, P/N 520024-501 (L/H) and -502 (R/H) per M20M Service and Maintenance Manual (S & M) No. 150, Section 32-10-00. The new truss will be identified by an "A-2" metal stamp on the fork (over center link) and a ink stamp "A-2" after paint.

2. Check for proper operation and rigging of landing gear retraction system after replacement of retraction truss assembly per S & M No. 150, Section 32-30-00.

3. Remove the 8 ABS flap hinge fairings, (4 on each wing) by drilling out the rivets on fairing flanges and the side rivet on each outboard fairing. The two inboard fairings have screws attaching them to the fuselage belly fairing and one screw (inboard side) attaching ABS fairing to the inboard wing flap hinge arm aluminum fairing. All ABS flap hinge fairings will be modified prior to re-installation. (See Step 4 below)

4. Remove flap gap seals, P/N 210374-001 (1 pc) & -003 (2 pcs), from left wing and P/N 210374-002 (1 pc) & -004 (2 pcs), from right wing by: (1) Drill out the lower forward row of rivets holding forward edge of aluminum gap seal on, & (2) Lower flaps, drill out row of rivets holding aluminum channels, P/N 210375-1 (1 pc) and -003 (2 pcs) from each wing (Reference Figure SB M20-248-1). Remove the flap gap seals with the channels still attached.

5. The AVEX 1601-0401 rivets being drilled out will leave portions of the rivet inside the wing. THESE NEED TO BE REMOVED. Enlarge the existing No. 30 hole outboard of each aft rib (rib rivet line can be seen on wing skins) to a .250 hole (8 holes on each wing). Forcefully use hand or rubber mallet to hit wing skin area (DO NOT DAMAGE SKINS) and a magnet to move rivet residue toward .250 hole and remove all pieces, with magnet, through hole. This should be done between each rib bay.

6. After all drilled rivet residue is removed. Install A10-80 Rivnuts in each enlarged hole. (16 places)

7. Trim ABS flap hinge fairings, P/N 210398-005 (LH) & -006 (RH) (1 each side) inboard, P/N 210379-009 (LH) & -010 (RH) (2 each side) mid, and P/N 210379-011 & -012 (1 each side) outboard, per Figures SB M20-248-2A & 2B.

8. A new hole will be required in outboard "side wall" of each middle ABS fairing, now to be identified as P/N 210379-013 (LH)(2 ea) & -014 (RH)(2 ea) to match tooling hole in the two middle wing flap hinge arm aluminum fairings, P/N 210106. (L & R wing). Reference Figure SB M20-248-3 for basic instructions to drill holes.

9. NOTE: Outboard hole of middle & inboard fairings will require enlarging to .189 (No. 12 hole) so MS35207-263 screw can be used in the A10-80 rivet to secure fairing flange. Re-install each modified fairing using appropriate existing rivet holes in wing skins that match remaining hole in flange of each ABS hinge fairing and new hole to match tooling hole in wing flap hinge arm fairings. Use AVEX 1601-0410 (or equivalent) blind rivets and MS35207-263 screws to attach ABS fairings.
10. Use AVEX 1601-0410 rivets (59 each row, minus ABS fairing attach holes and enlarged holes for rivnuts)) to fill remaining holes in wing skins drilled out during removal of gap seals and channels. Reference Figure SB M20-248-1.

11. Install MS35207-263 screws in all other enlarged holes to seal up wing skin area. (Total of (16) MS35207-263 screws are required for all enlarged holes.)

12. Repainting of the now exposed wing flap gap area will be required. Contact Mooney Service Parts Department for paint color P/N for aircraft Serial Number.

13. Remove existing airspeed indicator, P/N 820308-527, and replace with new airspeed indicator, P/N 820308-531, included in this kit; it incorporates new airspeed markings for the increased weight performance.

14. After airspeed indicator has been replaced and all lines secured, perform pitot/static check for leaks.

15. Remove the OPERATING LIMITATIONS placard from pilot’s side panel and replace with new OPERATING LIMITATIONS placard, P/N 150080-980, included in kit.


**WARRANTY:** Mooney Aircraft Corporation will perform all retrofit action at the factory service facility. Aircraft owners will need to contact the Product Support Department, (830) 896-6000, ext. 1904, to make arrangements for scheduling aircraft.

**REFERENCE DATA:** N/A

**PARTS LIST:** KIT PART NUMBER SB M20-248-1

<table>
<thead>
<tr>
<th>ITEM</th>
<th>P/N</th>
<th>DESCRIPTION</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>520024-501(A-2)</td>
<td>RETRACT TRUSS ASSY, LH</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>520024-502 (A-2)</td>
<td>RETRACT TRUSS ASSY, RH</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>820308-531</td>
<td>AIRSPEED INDICATOR</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>150080-980</td>
<td>PLACARD</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>1601-0410</td>
<td>RIVET, AVEX</td>
<td>240</td>
</tr>
<tr>
<td>6.</td>
<td>A10-80.</td>
<td>RIVNUT.</td>
<td>16</td>
</tr>
<tr>
<td>7.</td>
<td>MS35207-263</td>
<td>SCREWS</td>
<td>16</td>
</tr>
<tr>
<td>8.</td>
<td>N/A</td>
<td>AFM SUPPLEMENT SB M20-248</td>
<td>1</td>
</tr>
</tbody>
</table>

**FIGURES/TABLES:** See Figures on next pages.
FIGURE SB M20-248-2A

FIGURE SB M20-248-1

TRIM EXISTING ABS FAIRINGS TO DIMENSIONS SHOWN.
DOTTED LINES INDICATE UNTRIMMED CONFIGURATION.
FAIRING
210396-005 (SHOWN)
-006 (OPP)

NEW CONFIGURATION P/N.

FIGURE SB M20-248-2B

MS35207-263

VIEW LOOKING UP, LH SIDE

FIGURE SB M20-248-3
MOONEY AIRCRAFT CORPORATION  
P.O. BOX 72  
KERRVILLE, TEXAS 78029-0072  

FAA APPROVED  
AIRPLANE FLIGHT MANUAL SUPPLEMENT  
FOR  
Mooney Aircraft Model  
M20M  
WITH  
- INCREASED TAKEOFF WEIGHT MODIFICATIONS -  
MOONEY SERVICE BULLETIN M20-248  

REG. NO._______________________________________________  
SERIAL NO.______________________________________________  

This Supplement must be attached to the M20M FAA Approved Pilot's Operating Handbook and Airplane Flight Manual (POH/AFM), No. 3500, when the Increased Takeoff Weight modifications have been installed in accordance with Mooney Service Bulletin M20-248, dated 3-20-90 or subsequent revisions. The information contained herein supplements or supersedes the basic manual only in those areas listed by a vertical black mark in the margin. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

FAA APPROVED:  
[Signature]

Henry A. Armstrong, Manager  
Aircraft Certification Service  
FEDERAL AVIATION ADMINISTRATION  
Fort Worth, Texas.  
76193-0150  

Date: 3 - 16 - 90  
Revision A 4 - 96

PAGE 1 of 4
# MOONEY AIRCRAFT CORPORATION

P. O. BOX 72
Kerrville, Texas 78029-0072

## LOG OF REVISIONS

<table>
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<th>Description of Revisions</th>
<th>FAA Approved</th>
<th>Date</th>
</tr>
</thead>
<tbody>
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<td>A</td>
<td>Title Page, Log of Revisions, ii thru iv, 1-5, 2-3, 2-4, 2-8, 5-13, 8-7 6-6, 6-7</td>
<td>Added Revision A to pages. Revised Data Revised Graphs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The revised portions of affected pages are indicated by vertical black lines in the margin.
This supplement is to provide the operating procedures and performance data for the M20M aircraft, S/N 27-0001 thru 27-0052 when modified according to Mooney Service Bulletin M20-248, dated 3-20-90 or subsequent revisions.

The pages of AFM Supplement, SB M20-248, will supercede the basic pages of POH/AFM, No. 3500, Revision B or later revisions in the areas marked with a vertical black line in the margin. The data on the entire page is provided for immediate reference even though some of it may be the same as the basic POH/AFM.

**SECTION I - GENERAL:**

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Number  1-5

**SECTION II - LIMITATIONS**

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Numbers  2-2, 2-3, 2-4, 2-8, 2-12

**SECTION III - EMERGENCY PROCEDURES**

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Number  3-1, 3-5, 3-15, 3-16

**SECTION IV - NORMAL PROCEDURES**

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Numbers  4-4, 4-14, 4-18, 4-19

**SECTION V - PERFORMANCE**

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Numbers  5-13 thru 5-19, 5-21 thru 5-30

**SECTION VI - WEIGHT AND BALANCE**

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Numbers  6-2, 6-6 thru 6-8
SECTION VII - AIRPLANE AND SYSTEMS DESCRIPTION:

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Number No pages changed.

SECTION VII - HANDLING, SERVICE AND MAINTENANCE

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Number 8-7

SECTION IX - SUPPLEMENTAL DATA

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Numbers All Supplemental Pages for SB M20-248 added to this Section.

SECTION X - SAFETY & OPERATIONAL TIPS

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Number No pages changed.

NOTE: ALL PAGES LISTED UNDER SECTION HEADINGS ABOVE MUST BE INCLUDED IN THIS SUPPLEMENT AND INSERTED INTO THE POH/AFM OF ANY AIRCRAFT WHICH HAS MOONEY SERVICE BULLETIN M20-248, DATED 3-20-90 OR SUBSEQUENT REVISIONS COMPLIED WITH.
**M20M CERTIFICATED WEIGHTS**

<table>
<thead>
<tr>
<th>Weight Category</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Weight</td>
<td>3368 Lbs. (1528 Kg)</td>
</tr>
<tr>
<td>Maximum Landing Weight</td>
<td>3200 Lbs. (1452 Kg)</td>
</tr>
<tr>
<td>Baggage Area</td>
<td>120 Lbs. (54.4 Kg)</td>
</tr>
<tr>
<td>Rear Storage Area</td>
<td>10 Lbs. (4.5 Kg)</td>
</tr>
<tr>
<td>Cargo (Rear Seats Folded down)</td>
<td>340 Lbs. (154.2 Kg)</td>
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</tbody>
</table>

**STANDARD AIRPLANE WEIGHTS**

<table>
<thead>
<tr>
<th>Weight Category</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Basic Empty Weight</td>
<td>See Definition, Page 1-8</td>
</tr>
<tr>
<td>Useful Load</td>
<td>Varies with installed equipment.</td>
</tr>
<tr>
<td></td>
<td>See SECTION VI for specific airplane weight (pg. 6-6).</td>
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</table>

**CABIN AND ENTRY DIMENSIONS**

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<tr>
<th>Dimension</th>
<th>Measurement</th>
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<tbody>
<tr>
<td>Cabin Width (Maximum)</td>
<td>43.5 In. (110.5 cm)</td>
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<tr>
<td>Cabin Length (Maximum)</td>
<td>126 In. (315 cm)</td>
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<tr>
<td>Cabin Height (Maximum)</td>
<td>44.5 In. (113 cm)</td>
</tr>
<tr>
<td>Entry Width (Minimum)</td>
<td>29.0 In. (73.4 cm)</td>
</tr>
<tr>
<td>Entry Height (Minimum)</td>
<td>35.0 In. (88.9 cm)</td>
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</table>

**BAGGAGE SPACE AND ENTRY DIMENSIONS**

<table>
<thead>
<tr>
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<th>Measurement</th>
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<tbody>
<tr>
<td>Compartment Width</td>
<td>24 In. (60.9 cm)</td>
</tr>
<tr>
<td>Compartment Length</td>
<td>43 In. (109.2 cm)</td>
</tr>
<tr>
<td>Compartment Height</td>
<td>35 In. (88.9 cm)</td>
</tr>
<tr>
<td>Compartment Volume</td>
<td>20.9 Cu. Ft.</td>
</tr>
<tr>
<td>Cargo Area (with rear seat folded down)</td>
<td>38.6 Cu. Ft.</td>
</tr>
<tr>
<td>Entry Height (Minimum)</td>
<td>20.5 In. (52.1 cm)</td>
</tr>
<tr>
<td>Entry Width</td>
<td>17.0 In. (43.2 cm)</td>
</tr>
<tr>
<td>Ground to Bottom of Sill</td>
<td>46.0 In. (116.8 cm)</td>
</tr>
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**SPECIFIC LOADINGS**

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<tr>
<th>Loading</th>
<th>Maximum Gross Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wing Loading @</td>
<td>18.3 Lbs./Sq. Ft. (89.5 Kg/sq. m)</td>
</tr>
<tr>
<td>Power Loading @</td>
<td>11.85 Lbs./HP (5.38 Kg/HP)</td>
</tr>
</tbody>
</table>

**IDENTIFICATION PLATE**

All correspondence regarding your airplane should include the Serial Number as depicted on the identification plate. The identification plate is located on the left hand side, aft end of the tail cone, below the horizontal stabilizer leading edge. The aircraft Serial Number and type certificate are shown.
GENERAl AIRSPEED TERMINOLOGY & SYMBOLS

G  Acceleration due to gravity.
GS  GROUND SPEED - Speed of an airplane relative to the ground.
KCAS  KNOTS CALIBRATED AIRSPEED - The indicated speed of an aircraft, corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.
KIAS  KNOTS INDICATED AIRSPEED - The speed of an aircraft as shown on its airspeed indicator. IAS values published in this handbook assume zero instrument error.
KTAS  KNOTS TRUE AIRSPEED - The airspeed of an airplane relative to undisturbed air.
Va  MANEUVERING SPEED - The maximum speed at which application of full available aerodynamic control will not overstress the airplane.
Vfe  MAXIMUM FLAP EXTENDED SPEED - The highest speed permissible with wing flaps in a prescribed extended position.
Vle  MAXIMUM LANDING GEAR EXTENDED SPEED - The maximum speed at which an aircraft can be safely flown with the landing gear extended.
Vlo  MAXIMUM LANDING GEAR OPERATING SPEED - The maximum speed at which the landing gear can be safely extended or retracted.
Vne  NEVER EXCEED SPEED or MACH NUMBER - The speed limit that may not be exceeded at any time.
Vno  MAXIMUM STRUCTURAL CRUISING SPEED - The speed that should not be exceeded except in smooth air and then only with caution.
vs  STALLING SPEED - The minimum steady flight speed at which the airplane is controllable.
Vso  STALLING SPEED - The minimum steady flight speed at which the airplane is controllable in the landing configuration.
vx  BEST ANGLE-OF-CLIMB SPEED - The airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.

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<td>29</td>
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<td>2-12</td>
</tr>
<tr>
<td>CABIN INTERIOR</td>
<td>2-12</td>
</tr>
<tr>
<td>FUSELAGE INTERIOR</td>
<td>2-16</td>
</tr>
<tr>
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<tr>
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<td>2-18</td>
</tr>
<tr>
<td>OPTIONAL</td>
<td>2-20</td>
</tr>
</tbody>
</table>
SECTION II  AIRPLANE FLIGHT MANUAL SUPPLEMENT  MOONEY LIMITATIONS

INTRODUCTION

Section II includes the mandatory operating limitations, instrument markings, and basic placards necessary for the safe operation of the airplane, its engine, standard systems and standard equipment. The limitations included in this section have been approved by the Federal Aviation Administration. When applicable, limitations associated with optional systems or equipment such as autopilots are included in Section IX.

NOTE

The airspeeds listed in the Airspeed Limitations chart (Figure 2-1) and the Airspeed Indicator Markings chart Figure 2-2) are based on Airspeed Calibration data shown in Section V with the normal static source. If the alternate static source is being used, ample margins should be observed to allow for the airspeed calibration variations between the normal and alternate static sources as shown in Section V.

Your Mooney is certificated under FAA Type Certificate No. 2A3 as a Mooney M20M.

NOISE LIMITS

The certificated noise level for the Mooney M20M at 3368 lbs. (1528 Kg.) maximum weight is 74.03 dB(A). No determination has been made by the Federal Aviation Administration that the noise levels of this airplane are or should be acceptable or unacceptable for operation at, into, or out of, any airport.
Airspeed limitations and their operational significance are shown in Figure 2-1. This calibration assumes zero instrument error.

<table>
<thead>
<tr>
<th>V / SPEED</th>
<th>KCAS/KIAS</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{NE}</td>
<td>Never Exceed Speed</td>
<td>1951195</td>
</tr>
<tr>
<td>V_{NO}</td>
<td>Maximum Structural Cruising Speed</td>
<td>1741174</td>
</tr>
<tr>
<td>V_{A}</td>
<td>Maneuvering Speed at:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>lbs. /Kg.</td>
<td>1111111</td>
</tr>
<tr>
<td></td>
<td>260011179</td>
<td>1111111</td>
</tr>
<tr>
<td></td>
<td>290011315</td>
<td>1171117</td>
</tr>
<tr>
<td></td>
<td>320011452</td>
<td>1231123</td>
</tr>
<tr>
<td></td>
<td>336811528</td>
<td>1261127</td>
</tr>
<tr>
<td>V_{FE}</td>
<td>Maximum Flap Extended Speed</td>
<td>1091110</td>
</tr>
<tr>
<td>V_{LE}</td>
<td>Maximum Landing Gear Extended Speed</td>
<td>165/165</td>
</tr>
<tr>
<td>V_{O}_G (EXT)</td>
<td>Max. Speed for Gear Extension</td>
<td>1391140</td>
</tr>
<tr>
<td>V_{O}_G (RET)</td>
<td>Max. Speed for Gear Retraction</td>
<td>1041106</td>
</tr>
<tr>
<td>V_{O}_W</td>
<td>Maximum Pilot Window Open Speed</td>
<td>133/132 *</td>
</tr>
<tr>
<td></td>
<td>*Some A/C may show lower speeds</td>
<td></td>
</tr>
</tbody>
</table>

FIGURE 2-1 AIRSPEED LIMITATIONS

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AIRPLANE FLIGHT MANUAL
MOONEY AIRPLANE FLIGHT MANUAL SUPPLEMENT
M20M
SECTION II
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2 - 3
Airspeed indicator markings, their color code and operational significance are shown in Figure 2-2.

<table>
<thead>
<tr>
<th>MARKING</th>
<th>IAS VALUE or RANGE (KIAS)</th>
<th>SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mite Arc (Flap Operating Range)</td>
<td>59-110 KIAS</td>
<td>Lower limit is maximum weight ( V_{so} ) in landing configuration. Upper limit is maximum speed permissible with flaps extended.</td>
</tr>
<tr>
<td>Green Arc (Normal Operating Range)</td>
<td>66-174 KIAS</td>
<td>Lower limit is maximum weight ( V_s ) with flaps retracted. Upper limit is maximum structural cruising speed.</td>
</tr>
<tr>
<td>Yellow Arc (Caution Range)</td>
<td>174-195 KIAS</td>
<td>Operations must be conducted with caution and only in smooth air.</td>
</tr>
<tr>
<td>Radial Red Line</td>
<td>195 KIAS</td>
<td>Maximum speed for all operations.</td>
</tr>
</tbody>
</table>

**FIGURE 2-2  AIRSPEED INDICATOR MARKINGS**
FUEL LIMITATIONS:

WARNING

Takeoff maneuvers when the selected fuel tank contains less than 12 gallons (45.4 liters) of fuel have not been demonstrated.

NOTE

Each fuel quantity gauge is calibrated to read zero (RED LINE) only in coordinated level flight when the quantity of fuel can no longer be safely used.

NOTE

An optional visual fuel quantity gauge is installed on top of each tank and is to be used as a reference for refueling tanks only.

Standard Tanks (2) . 47.5 U.S. Gal. each (179.8 liters)
Total Fuel . . 95 U.S. Gal. (359.6 liters)
Usable Fuel: . . . 89 U.S. Gal. (336.8 liters)
Unusable Fuel: . . 6 U.S. Gal. (22.7 liters)

Fuel Grade (and color):
100LL (low lead) (blue) or 100 (green) is approved.

CAUTION

To reduce the possibility of ice formation within the aircraft or engine fuel system it is permissible to add ISO-PROPYL alcohol to the fuel supply in quantities NOT TO EXCEED 1% of the total fuel volume per tank. DO NOT add other additives to the fuel system due to potential deteriorating effects within the fuel system.
WEIGHT LIMITS

Maximum Weight - Takeoff .............. 3368 lb. (1528 Kg.)
Maximum Weight - Landing .............. 3200 lb. (1452 Kg)
Maximum Weight in Baggage Compartment .................. 120 lb. (54.4 Kg.)
@ Fus. Sta. 101.5 (257.8 cm)
Maximum Weight in Rear Storage Area .............. 10 lb. (4.54 Kg.)
@ Fus. Sta. 131.0 (332.7 cm)
Maximum Weight in Cargo Area (Rear seats folded down) ........ 340 lbs. (154.2 KG)
@ Fus. Sta. 70.7 (179.5 cm)

CENTER OF GRAVITY LIMITS (GEAR DOWN)

Most Forward ................ Fus. Sta. 41.0 IN. (104.1 cm) @ 2430 LB. (1102 Kg)
Intermediate Forward .............. Fus. Sta. 44 IN. (111.7 cm) @ 3300 lb. (1497 Kg)
Forward Gross ................ Fus. Sta. 46.0 IN. (116.8 cm) @ 3368 lb (1528 Kg)
Aft Gross ................ Fus. Sta. 51.0 IN (129.5 cm) @ 3368 lb. (1528 Kg)
MAC (at Wing Sta. 94.85) (241 cm) ........ 61.00 IN. (154.9 cm)

Datum (station zero) is 13 inches (32.5 cm) aft of the center line of the nose gear trunion attach/pivot bolts.

MANEUVER LIMITS

This airplane must be operated as a Normal Category airplane. Aerobatic maneuvers, including spins, are prohibited.

[NOTE]
Up to 400 foot altitude loss may occur during stalls at maximum weight.

FLIGHT LOAD FACTOR LIMITS

Maximum Positive Load Factor
Flaps Up .................. + 3.8 g.
Flaps Down (33 Degrees) ........ + 2.0 g.

Maximum Negative Load Factor
Flaps Up .................. - 1.5 g.
Flaps Down .............. .0.0 g.

FLIGHT CREW

Pilot ................ One
Maximum passenger seating configuration ................ Three
KINDS OF OPERATION EQUIPMENT LIST (con't.)

SYSTEM or COMPONENT (con't.)

<table>
<thead>
<tr>
<th>System/Component</th>
<th>VFR DAY</th>
<th>VFR NIGHT</th>
<th>IFR DAY</th>
<th>IFR NIGHT</th>
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<td>CLOCK (WITH SWEEP SECOND HAND or DIGITAL)</td>
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<tr>
<td>COMMUNICATION SYSTEM</td>
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<td>NAVIGATION SYSTEM (APPROPRIATE TO FACILITIES BEING USED)</td>
<td>1</td>
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<tr>
<td>BATTERY</td>
<td>1</td>
<td>1</td>
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<td>1</td>
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<tr>
<td>VACUUM SYSTEM/INDICATOR</td>
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<td>FUEL BOOST PUMP</td>
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<tr>
<td>PILOT'S OPERATING HANDBOOK &amp; AIRPLANE FLIGHT MANUAL</td>
<td>1</td>
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<td>OAT GAUGE ****</td>
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<td>VSI ****</td>
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<td>STAND-BY VACUUM SYSTEM ****</td>
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<td></td>
</tr>
</tbody>
</table>

* Equipment must be installed and operable for all operations.
**** When required by the appropriate regulations.
The following placards are relevant to proper operation of the airplane and must be installed inside the cabin at the locations specified.

### OPERATING LIMITATIONS

The airplane contain operating limitations which must be complied with when operating this airplane in the normal category. This airplane is certified for day and night VFR operation when the required equipment is installed and operational. Right into known icing conditions is prohibited. Aircraft maneuvers including spins are approved; other operating limitations which must be complied with when operating this airplane in M-1S category are contained in the airplane flight manual.

**Manding Speed** (1388 LBS), 127 KIAS, (2600 LBS), 111 KIAS.

### EMERGENCY MANUAL GEAR EXTENSION

1. Pull landing gear circuit breaker.
2. Put gear switch in gear down position.
3. Push release tab forward and lift up red handle.
4. Pull t-handle straight up (12 to 17 inches).
5. Allow t-handle to return to original position.
6. Repeat until gear down light comes on (12 to 20 pulls). If total electrical failure, see electrical indicator.

### CAUTION

1. Turn off strobe lights when taking near other aircraft or when flying in fog or in clouds. Strobe position lights must be used for all night operations.
2. In case of fire turn off cabin heat.
3. Do not screw the vertical controls closer than 1/8" from full face.

### CHECK LIST

**TAKE OFF**
- Controls
- Fuel
- Instruments
- Trim
- Cowl flaps
- Conduct rudder/elevator trim check prior to flight, see pilot's operating handbook.

**LANDING**
- Belt harness
- Fuel
- Boost pump
- Gear
- Wing flaps
- Mixture
- Prop
- Park brake

### BATTERIES

Batteries must be installed for flight.

### ON BATTERY ACCESS PANELS

- Upper L/H & R/H
- Start stop
- Clear mode
- FAA APPROVED
- Issued 6-89
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<tr>
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</tr>
<tr>
<td>ICE PROTECTION</td>
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</tr>
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<td>3-21</td>
</tr>
<tr>
<td>OTHER EMERGENCIES</td>
<td>3-21</td>
</tr>
</tbody>
</table>
### AIRSPEEDS FOR EMERGENCY OPERATIONS

#### Engine Failure after Takeoff
- **Wing Flaps UP**: 85 KIAS
- **Wing Flaps DOWN**: 80 KIAS

#### Best Glide Speed
<table>
<thead>
<tr>
<th>Weight</th>
<th>KIAS</th>
</tr>
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<tbody>
<tr>
<td>3368 lb/1528 kg</td>
<td>93.5</td>
</tr>
<tr>
<td>3200 lb/1452 kg</td>
<td>89.0</td>
</tr>
<tr>
<td>2900 lb/1315 kg</td>
<td>84.5</td>
</tr>
<tr>
<td>2600 lb/1179 kg</td>
<td>80.0</td>
</tr>
</tbody>
</table>

#### Maneuvering Speed
<table>
<thead>
<tr>
<th>Weight</th>
<th>KIAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3368 lb/1528 kg</td>
<td>127</td>
</tr>
<tr>
<td>3200 lb/1452 kg</td>
<td>123</td>
</tr>
<tr>
<td>2900 lb/1315 kg</td>
<td>117</td>
</tr>
<tr>
<td>2600 lb/1179 kg</td>
<td>111</td>
</tr>
</tbody>
</table>

#### Precautionary Landing with Engine Power - Flaps DOWN
- 75 KIAS

#### Precautionary Landing above 3200 Lbs
- 80 KIAS

#### Emergency Descent (Gear UP)
- **Smooth Air**: 195 KIAS
- **Turbulent Air**
  - 3368 lb/1528 kg: 127 KIAS
  - 3200 lb/1452 kg: 123 KIAS
  - 2900 lb/1315 kg: 117 KIAS
  - 2600 lb/1179 kg: 111 KIAS

#### Emergency Descent (Gear DOWN)
- **Smooth Air**: 165 KIAS
- **Turbulent Air**
  - 3368 lb/1528 kg: 127 KIAS
  - 3200 lb/1452 kg: 123 KIAS
  - 2900 lb/1315 kg: 117 KIAS
  - 2600 lb/1179 kg: 111 KIAS

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# ANNUNCIATOR PANEL WARNING LIGHTS

<table>
<thead>
<tr>
<th>WARNING LIGHT</th>
<th>FAULT &amp; REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEAR UNSAFE</td>
<td>RED light indicates landing gear is not in fully extended/or retracted position. Refer to &quot;Failure of landing gear to extend electrically&quot; procedure on page 3-17 or &quot;Failure of Landing Gear to Retract&quot; procedure on page 3-18.</td>
</tr>
<tr>
<td>LEFT or RIGHT FUEL</td>
<td>RED light indicates 2 1/2 to 3 gallons (9.5 to 11.4 liters) of usable fuel remain in the respective tanks. Switch to fuller tank.</td>
</tr>
<tr>
<td>FUEL PRESSURE</td>
<td>RED light indicates fuel pressure has dropped below 24 PSI. Refer to &quot;LOW FUEL PRESSURE&quot; procedures on Page 3-12.</td>
</tr>
<tr>
<td>PROP DE-ICE</td>
<td>BLUE light indicates power applied to De-Ice boots</td>
</tr>
<tr>
<td>PITOT HEAT</td>
<td>BLUE light indicates power is applied to heater. (On French A/C ONLY-RED light indicates power is NOT applied to heater.)</td>
</tr>
<tr>
<td>STD BY VAC</td>
<td>AMBER light indicates stand by vacuum pump is clutched to the engine &amp; providing vacuum to system.</td>
</tr>
<tr>
<td>LOW VOLTS</td>
<td>RED light indicates voltage has dropped below 26.0 volts. Refer to &quot;Alternator Low Voltage&quot; procedure on page 3-16.</td>
</tr>
<tr>
<td>HI/LO VAC</td>
<td>RED flashing light indicates suction is below 4.25 inches of mercury. RED steady light indicates suction is above 5.2 inches of mercury.</td>
</tr>
</tbody>
</table>

| NOTE | When either a steady (HI) or flashing (LO) VAC light is illuminated, the information obtained from the attitude and directional gyros is unreliable. Vacuum system should be checked and/or adjusted as soon as practicable. |
Greater glide distances can be attained by moving the propeller control FULL AFT (LOW RPM).

MAXIMUM GLIDE DISTANCE
MODEL M20M

FORCED LANDING EMERGENCY

GEAR RETRACTED OR EXTENDED

- Emergency Locator Transmitter: ARMED
- Seat Belts and Shoulder Harnesses: SECURE
- Cabin Door: UNLATCHED
- Fuel Selector: OFF
- Mixture: IDLE CUTOFF
- Magneto/Starter Switch: Full DOWN
- Flaps: DOWN-if conditions permit
- Gear: OFF, prior to landing
- Approach Speed: 80 KIAS
- Master Switch: OFF
OVERWEIGHT LANDING PROCEDURES

In the event it is necessary to land with a weight exceeding 3200 Lbs. (max. landing weight) the following procedure is recommended in addition to normal Approach for Landing procedures:

- Approach Airspeed: 80 KIAS
- Use flatter approach angle than normal with power as necessary until a smooth touchdown is assured.
- Expect landing distance over a 50 feet obstacle (Ref. Section V) to increase at least 600 feet.
- Conduct Gear & Tire Servicing inspection per Section VIII.

SYSTEMS EMERGENCIES:

PROPELLER

PROPELLER OVERSPEED

- Throttle: RETARD
- Oil Pressure: CHECK
- Propeller: DECREASE set if any control available
- Airspeed: REDUCE
- Throttle: AS REQUIRED to maintain RPM below 2575 RPM

FUEL

LOW FUEL FLOW

- Check mixture: ENRICH
- Fuel Selector: Switch TANKS

If condition persists, use Boost Pump Switch if necessary and LANDING should be made as soon as PRACTICABLE.

ELECTRICAL

ALTERNATOR OVERVOLTAGE
(Voltage warning light illuminated steady and Alternator Field circuit breaker popped on affected alternator.)

- Alternator Field Circuit Breaker: RESET

If circuit breaker will not reset, the following procedures are required:

1. Monitor buss voltage and the output load of the remaining alternator.
2. Reduce electrical load, if needed, to maintain a buss voltage of 28 VDC and to operate within the load capacity of the remaining alternator.
3. Continue flight on the remaining alternator and land, when practical, to correct the malfunction.

ALTERNATOR OUTPUT LOW
(Output low or zero on one alternator)

- Affected Alternator Field Switch: OFF then ON

If output does not increase to near the same as the other alternator:

- Affected Alternator Field Switch: OFF
- Electrical Load: MONITOR

1. Monitor buss voltage and the output load of the remaining alternator.
2. Reduce electrical load, if needed, to maintain a buss voltage of 28 VDC and to operate within the load capacity of the remaining alternator.
3. Continue flight on the remaining alternator and land, when practical, to correct the malfunction.
This section describes the recommended procedures for the conduct of normal operations for the airplane. All of the required (FAA regulations) procedures and those necessary for operation of the airplane as determined by the operating and design features of the airplane are presented.

These procedures are provided to present a source of reference and review and to supply information on procedures which are the same for all aircraft. Pilots should familiarize themselves with the procedures given in this section in order to become proficient in the normal operations of the airplane.

Normal procedures associated with those optional systems and equipment which require handbook supplements are provided by Section IX (Supplemental Data).
Unless otherwise noted, the following speeds are based on a maximum weight of 3368 pounds and may be used for any lesser weight. However, to achieve the performance specified in Section V for takeoff distance and climb performance, the speed appropriate to the particular weight must be used.

TAKEOFF:

Normal Climb Out . 80-90 KIAS
Short Field Takeoff, Speed At 50 Ft. . 75 KIAS

ENROUTE CLIMB, GEAR and FLAPS UP:

Best Rate of Climb . 105 KIAS
Best Angle of Climb . 85 KIAS

LANDING APPROACH (3200 lbs.):

Normal Approach, Flaps 10 degrees . 80 KIAS
Normal Approach, Flaps 33 degrees . 75 KIAS
Short Field Approach, Flaps 33 degrees . 70 KIAS

BALKED LANDING (3200 lbs.):

Maximum Power, Flaps 10 degrees . 85 KIAS

MAXIMUM RECOMMENDED TURBULENT AIR PENETRATION SPEED:

3368 lbs./1528 Kgs . 127 KIAS
3200 lbs./1452 Kgs . 123 KIAS
2900 lbs./1315 Kgs . 117 KIAS
2600 lbs./1179 Kgs . 111 KIAS
2400 lbs./1089 Kgs . 106 KIAS

MAXIMUM DEMONSTRATED CROSSWIND VELOCITY

Takeoff or Landing . 13 Knots
(This is NOT a Limitation)

(See CROSSWIND COMPONENT CHART, Section V)
Wing Flaps . CHECK operation.
  SET AT TAKEOFF position (10 Degrees)

Flight Controls . CHECK free and correct movement
Avionics and Auto Pilot . CHECK - (Refer to Section IX)
Seats, Seat Belts and Shoulder Harness . SECURED
Cabin Door . CHECK SECURED
Pilots Window . CLOSED
Internal/External Lights . AS DESIRED
Parking Brake . RELEASE
Strobe Lights . ON

TAKEOFF PROCEDURES

CAUTION

Proper engine operation should be checked early in the takeoff roll. Any
significant indication of rough or sluggish engine response is reason to
discontinue the takeoff.

When takeoff must be made over a gravel surface, it is important that the
throttle be applied SLOWLY. This will allow the aircraft to start rolling before
a high RPM is developed, and gravel or loose material will be blown back
from the propeller area instead of being pulled into it.

TAKEOFF

If the turbocharger and its controlling system are properly rigged, manifold pressure
will increase to 35 to 38 in. Hg. when the throttle is full open. However, engine
operation with oil temperature below 100°F will result in an overboost (manifold
pressure above 38 in. Hg.). If an overboost occurs, retard throttle to lower manifold
pressure below 38 in. Hg. and continue flight. As the oil warms above 100°F, throttle can be moved to full throttle position and controller will maintain proper
manifold pressure for maximum continuous power.

Full throttle operation during hot weather conditions may result in manifold pressure
over 38 in. Hg. If this occurs retard the throttle below 38 in. Hg. and continue flight.

Power . FULL THROTTLE (2575 RPM)
Annunciator . CHECK (BLUE Boost Pump Light - ON)
Engine Instruments . CHECK for proper indications
Lift Off/Climb Speed . As specified in Section V (Takeoff Distance)
Landing gear . RETRACT IN CLIMB after clearing obstacles.
Wing Flaps . UP
Fuel Pressure . 24 PSI (minimum)

---

NOTE

If maximum performance takeoffs are desired obtain full power before brake
release and lift off at 65 KIAS and climb at 75 KIAS.
SECTION IV
AIRPLANE FLIGHT MANUAL SUPPLEMENT
NORMAL PROCEDURES

MOONEY
MODEL M20M

--- CLIMB PROCEDURES ---

I NOTE I

If applicable, use noise abatement procedures as required.

CLIMB (CRUISE CLimb)

<table>
<thead>
<tr>
<th>Power</th>
<th>34 In. Hg./2400 RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixture</td>
<td>Rich</td>
</tr>
<tr>
<td>Cowl Flaps</td>
<td>Full Open or As Required</td>
</tr>
<tr>
<td>Rudder Trim</td>
<td>As Desired</td>
</tr>
<tr>
<td>Airspeed</td>
<td>.120 KIAS</td>
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</table>

--- NOTE ---

See Section V, for rate of climb graph.

CLIMB (BEST RATE)

<table>
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<tr>
<th>Power</th>
<th>FULL THROTTLE 12575 RPM</th>
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</thead>
<tbody>
<tr>
<td>Mixture</td>
<td>Rich</td>
</tr>
<tr>
<td>Cowl Flaps</td>
<td>Full Open</td>
</tr>
<tr>
<td>Rudder Trim</td>
<td>As Desired</td>
</tr>
<tr>
<td>Airspeed</td>
<td>.105 KIAS</td>
</tr>
</tbody>
</table>

--- NOTE ---

CLIMB (BEST ANGLE)

<table>
<thead>
<tr>
<th>Power</th>
<th>FULL THROTTLE12575 RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixture</td>
<td>Rich</td>
</tr>
<tr>
<td>Cowl Flaps</td>
<td>Full Open</td>
</tr>
<tr>
<td>Rudder Trim</td>
<td>As Desired</td>
</tr>
<tr>
<td>Airspeed</td>
<td>85 KIAS</td>
</tr>
</tbody>
</table>

--- CRUISE PROCEDURES ---

Airspeed . ACCELERATE to cruise airspeed
Throttle . SELECTED SETTING
(Ref. CRUISE PERFORMANCE CHARTS in Section V)
As the throttle is reduced, the BOOST PUMP annunciator light will extinguish.
Verify fuel pressure remains in GREEN arc.

--- NOTE ---

Prolonged climbs to high cruise altitudes during hot weather operations may result in some fuel pressure fluctuations (accompanied with possible fuel pressure annunciation) when the throttle is reduced. If fluctuations occur, turn Boost Pump Switch ON until cooling has alleviated fluctuations.
NORMAL - GEAR UP

Seats, Seat Belts, Shoulder Harness . ADJUST AND SECURE
Wing Flaps . UP
Landing Gear . UP
Throttle . ABOVE 15 in. Hg. (keep CHT in Green)
Propeller . 2400 RPM
Mixture . Peak TIT
Cowl Flaps . CLOSED
CHT . MONITOR (250°F minimum)
Airspeed . AS DESIRED (135 KIAS max.)
Rudder Trim . AS DESIRED

---

NORMAL - GEAR DOWN

Seats, Seat Belts, Shoulder Harness . ADJUST AND SECURE
Airspeed . DECELERATE to 140 KIAS
Landing Gear . DOWN
Throttle . ABOVE '15 in. Hg. (Keep CHT in Green Arc)
Propeller . 2400 RPM
Mixture . Peak TIT
Cowl Flaps . Closed
Cylinder Head Temperature . Monitor (250°F min)
Airspeed . 165 KIAS or LESS.

---

MOONEY MODEL M20M
SECTION IV NORMAL PROCEDURES

DETOCT PROCEDURES

Avoid extended descents at manifold pressure setting below 15 in. Hg., as the engine can cool excessively and may not accelerate satisfactorily when power is reapplied. Additionally, leaning the mixture to peak TIT during descent will save fuel and will eliminate any engine roughness associated with an overly rich mixture setting. During descent engine MP will tend to increase as the aircraft loses altitude. Occasional power reductions with the throttle may be required to maintain the original descent manifold pressure setting.

NORMAL - GEAR UP

Plan descents to arrive at pattern altitude on downwind leg for maximum fuel efficiency and minimum aircraft noise.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
~ CAUTION ~ ~

DO NOT fly in the YELLOW ARC speed range unless the air is smooth.

ISSUED 6-89
NOTE

Using the landing gear as a descent aid will result in a steeper descent rate (greater altitude loss per horizontal distance traveled).

**APPROACH FOR LANDING**

```
CAUTION
```

The airplane must be within the **allowable** weight and balance envelope for landing (REF. Section VI). It will require a minimum of one hour of flight before a permissible landing weight is attained when takeoffs are made at maximum gross weight. If a landing at a weight exceeding maximum landing weight (3200 Lbs) (1452 Kgs.) is required, see OVERWEIGHT LANDING PROCEDURE, Section III.

Sears, Seat Belts, Shoulder Harness

Internal/External lights

Landing gear

Boost Pump

Fuel Selector

Wing Flaps

Elevator Trim

Rudder Trim

---

**GO AROUND (BALKED LANDING)**

```
CAUTION
```

To minimize control wheel forces during maneuvering, timely nose-up trimming is recommended to counteract the nose down pitching moment as power is reduced and/or the flaps are extended.

Parking Brake

---

To minimize control wheel forces during maneuvering, timely nose-down trimming is recommended to counteract the nose up pitching moment as power is increased and/or the flaps are retracted.

Airspeed

Landing Gear

Wing Flaps

Airspeed
LANDING

Approach for Landing Checklist . COMPLETED
Wing Flaps . FULL DOWN
Landing Gear . DOWN and LOCKED
Approach Airspeed . As specified in Section V (Landing Distance)
Touchdown . MAIN WHEELS FIRST
Landing Roll LOWER nose wheel gently
Brakes . MINIMUM required

[NOTE]

Landing information for reduced flap settings are not available. See Section V for Landing Distance tables.

[NOTE]

If maximum performance landings are desired, use the above procedures except, reduce the approach airspeed to 70 KIAS (flaps full down) and apply maximum braking (without skidding tires) during rollout.

[NOTE]

Crosswind landings should be accomplished by using the above procedures except maintain approach speed appropriate for the wind conditions. Allow aircraft to crab until the landing flare. Accomplish the touchdown in a slight wing low sideslip (low wing into the wind) and the aircraft aligned with the runway. During the landing roll, position the flight controls to counteract the crosswind.

[CAUTION]

The landing gear may retract during landing roll if landing gear switch is placed in the UP position.

TAXI AFTER LANDING

Throttle . AS REQUIRED
Boost Pump . OFF
Cowl Flaps . OPEN
Wing Flaps . RETRACT
Elevator Trim . TAKEOFF SETTING
Avionics/Radios . AS REQUIRED
Interior/Exterior Lights . AS DESIRED

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Operate the engine at idle (below 1000 RPM) for 5 minutes to allow the TURBOCHARGER to COOL. Taxi time after landing may be considered as part of the 5 minutes.

Parking brake . SET
Throttle . 700 - 750 RPM
Radio Master Switch . OFF
Interior/Exterior Lights . OFF
Pitot Heat . OFF
Mixture . IDLE CUT-OFF
Alternator Field Switches (L/R) . OFF
Master Switch . OFF
Magneto/Starter Switch . OFF

**SECURING THE AIRCRAFT**

Magneto/Starter Switch . VERIFY OFF/ Key removed
Master Switch . VERIFY OFF
Radio Master Switch . Verify OFF
Rocker Switches . Verify OFF
Interior Light Switches . VERIFY OFF
Parking Brake . RELEASE - INSTALL WHEEL CHOCKS
Extended parking . CONTROL WHEEL SECURED with seat belts, cabin vents closed;
Cabin Windows and Doors . CLOSED AND LOCKED

TIE DOWN AIRCRAFT at wing and tail points.
## Stall Speed vs. Angle of Bank

**Associated Conditions:**
- Forward CG
- Power idle

**Note:** Up to 400 feet altitude loss may occur during stalls at maximum weight.

### Table

<table>
<thead>
<tr>
<th>Gross Weight</th>
<th>Gear and Flap Position</th>
<th>Angle of Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>KCAS</td>
</tr>
<tr>
<td>3368 LBS (1528 KGS)</td>
<td>Gear Up, Flaps 0°</td>
<td>66.0</td>
</tr>
<tr>
<td></td>
<td>Gear Down, Flaps 10°</td>
<td>64.5</td>
</tr>
<tr>
<td></td>
<td>Gear Down, Flaps 33°</td>
<td>60.0</td>
</tr>
<tr>
<td>3000 LBS (1361 KGS)</td>
<td>Gear Up, Flaps 0°</td>
<td>62.5</td>
</tr>
<tr>
<td></td>
<td>Gear Down, Flaps 10°</td>
<td>61.0</td>
</tr>
<tr>
<td></td>
<td>Gear Down, Flaps 33°</td>
<td>55.5</td>
</tr>
<tr>
<td>2700 LBS (1225 KGS)</td>
<td>Gear Up, Flaps 0°</td>
<td>59.0</td>
</tr>
<tr>
<td></td>
<td>Gear Down, Flaps 10°</td>
<td>58.0</td>
</tr>
<tr>
<td></td>
<td>Gear Down, Flaps 33°</td>
<td>53.0</td>
</tr>
</tbody>
</table>

**Example:** Landing gear down, angle of bank 15°, weight 3000 LBS (1361 KGS), stall speed 72.5 KCAS (73.0 KIAS).
MAXIMUM DEMONSTRATED CROSSWIND IS 13 KNOTS, CONDITIONS OF HIGH HUMIDITY CAN RESULT IN AN INCREASE OF UP TO 10% TO THE TAKEOFF DISTANCE.

ASSOCIATED CONDITIONS

- POWER FULL \(\text{THROTTLE/2575 RPM}\)
- LANDING GEAR \(\text{DOWN UNTIL OBSTACLE CLEARED}\)
- WING FLAPS \(\text{WING FLAPS FULL OPEN}\)
- COWL FLAPS \(\text{FULL OPEN}\)
- RUNWAY SURFACE \(\text{PAVED, LEVEL DRY}\)

EXAMPLE:

- OAT \(\text{204°C}\)
- PRESSURE \(\text{10000 FT, ALTITUDE}\)
- WEIGHT \(\text{2900 LBS (1315 KGS)}\)
- HEADWIND \(\text{5 KTS COMP}\)
- GROUND ROLL \(\text{900 FT, OBSTACLE HEIGHT 150 FT}\)

TAKEOFF DISTANCE - HARD SURFACE
TAKEOFF DISTANCE - GRASS SURFACE

<table>
<thead>
<tr>
<th>TAKEOFF WEIGHT - LBS (KGS)</th>
<th>TAKEOFF SPEED KIAS</th>
<th>SPEED AT 50 FT. - KIAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3368 LBS (1526 KGS)</td>
<td>66</td>
<td>80</td>
</tr>
<tr>
<td>3108 LBS (1406 KGS)</td>
<td>64</td>
<td>78</td>
</tr>
<tr>
<td>2700 LBS (1225 KGS)</td>
<td>59</td>
<td>74</td>
</tr>
</tbody>
</table>

NOTE: 1. MAXIMUM DEMONSTRATED CROSSWIND IS 19 KNOTS.
   2. CONDITIONS OF HIGH HUMIDITY CAN RESULT IN AN INCREASE OF UP TO 10% TO THE TAKEOFF DISTANCE.

ASSOCIATED CONDITIONS:
- POWER: FULL THROTTLE/2575 RPM
- LANDING GEAR: DOWN UNTIL OBSTACLE CLEARED
- WING FLAPS: 10°
- GND FLAPS: FULL OPEN
- RUNWAY SURFACE: SHORT DRY GRASS, LEVEL

EXAMPLE:
- QNH: 2000 FT.
- ALTITUDE: 6000 FT.
- WEIGHT: 2900 LBS (1315 KGS)
- HEADING: 5 KTS
- COMPONENT: GROUND ROLL 500 FT. (152 M)
- TOTAL TAKEOFF 2000 FT. (610 M)
- DISTANCE: (50 FT. OBSTACLE)
SECTION V
AIRPLANE FLIGHT MANUAL SUPPLEMENT
MOONEY
MODEL M20M

PERFORMANCE

RATE OF CLimb - MAX CLB

[Graph showing rate of climb for different conditions]

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# M20M Cruise Power Settings and Fuel Flows

## Standard Day Conditions

<table>
<thead>
<tr>
<th>Altitude</th>
<th>OAT °C</th>
<th>34'/2400 RPM</th>
<th>32'/2400 RPM</th>
<th>30'/2200 RPM</th>
<th>27'/2200 RPM</th>
<th>24'/2200 RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Best Power</td>
<td>Peak Tit</td>
<td>Best Power</td>
<td>Peak Tit</td>
<td>Best Power</td>
</tr>
<tr>
<td>0</td>
<td>15</td>
<td>19.6</td>
<td>16.3</td>
<td>15.3</td>
<td>12.9</td>
<td>11.4</td>
</tr>
<tr>
<td>5000</td>
<td>5</td>
<td>20.1</td>
<td>17.0</td>
<td>16.0</td>
<td>13.7</td>
<td>12.3</td>
</tr>
<tr>
<td>10000</td>
<td>-5</td>
<td>20.4</td>
<td>17.4</td>
<td>16.4</td>
<td>14.3</td>
<td>12.8</td>
</tr>
<tr>
<td>15000</td>
<td>-15</td>
<td>20.6</td>
<td>17.5</td>
<td>16.5</td>
<td>14.5</td>
<td>13.1</td>
</tr>
<tr>
<td>20000</td>
<td>-25</td>
<td>20.6</td>
<td>17.6</td>
<td>16.5</td>
<td>14.7</td>
<td>13.3</td>
</tr>
<tr>
<td>25000</td>
<td>-35</td>
<td>20.5</td>
<td>---</td>
<td>16.6</td>
<td>14.6</td>
<td>13.3</td>
</tr>
</tbody>
</table>

## Notes:
1. Peak Tit indicates peak Tit or 175° F Tit.
2. Best power (at 34 in. Hg./2400 RPM) is 1650° F Tit.
3. When operating above 22000 feet, and at manifold pressures above 32 in. Hg., only best power mixture (1650° F Tit) or richer is permitted.
4. Cruise fuel flows decrease approximately .5 GPH for each 20° C above standard temperature.
5. Cruise fuel flows increase approximately .5 GPH for each 20° C below standard temperature.
TIME - FUEL - DISTANCE TO DESCEND
150 KIAS DESCENT SPEED

ASSOCIATED CONDITIONS:
POWER: 2000 RPM/Map as req'd to maintain
750 FPM RATE OF DESCENT
LANDING GEAR: UP
FLAPS: UP
COWL FLAPS: CLOSED
MIXTURE! PEAK TIT (DO NOT EXCEED 1750°F TIT)

EXAMPLE:
INITIAL PRESSURE ALT: 18000
FINAL PRESSURE ALT: 4000
TIME TO DESCEND: 24.0-5.0=19 MINUTES
FUEL TO DESCEND: 3.8-0.8=3.0 GALLONS (14.39-3.03=11.36 L)
DISTANCE TO DESCEND: 69.0-13.0=56.0 NAUTICAL MILES
(127.79-24.08=103.71 km)
LANDING DISTANCE

NOTE: 1) MAXIMUM DEMONSTRATED CROSSEND VIND IS 13 KNOTS.

ASSOCIATED CONDITIONS:
- POWER: IDLE
- LANDING GEAR: DOWN
- WING FLAPS: FULL DOWN (33°)
- RUNWAY SURFACE: PAVED, LEVEL, DRY
- BRAKING: MAXIMUM
- OAT: 15 °C
- PRESSURE ALTITUDE: 6000 FT.
- WEIGHT: 2800 LBS (1270 KG)
- HEADWIND: 5 KTS
- COMPONENT
- GROUND ROLL: 1350 FT. (411 M)
- TOTAL LANDING DISTANCE: 2600 FT. (853 M)

INDICATED TEMPERATURE, DEGREES CELSIUS

OUTSIDE AIR TEMPERATURE - °C

WEIGHT - POUNDS

WIND COMPONENT

OBSTACLE HEIGHT

FEET

OUTSIDE AIR TEMPERATURE - °C

WEIGHT - KG

WIND COMPONENT

OBSTACLE HEIGHT

FEET
LANDING DISTANCE - GRASS SURFACE

NOTE
1) MAXIMUM DEMONSTRATED CROSSWIND IS 13 KNOTS.

<table>
<thead>
<tr>
<th>LANDING WEIGHT - LBS (KG)</th>
<th>APPROACH SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000 (900)</td>
<td>130 (59)</td>
</tr>
<tr>
<td>2000 (900)</td>
<td>130 (59)</td>
</tr>
<tr>
<td>2000 (900)</td>
<td>130 (59)</td>
</tr>
</tbody>
</table>

EXAMPLE
- 0.5 GS
- 6000 F:
- 50 FT
- 2800 LBS (1270 KG)
- 5 KTS

GROUP ROLL
- 1650 FT (5003 K)
- TOTAL LANDING DISTANCE
- OBSTACLE
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<tr>
<td>AIRPLANE WEIGHING PROCEDURE</td>
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<tr>
<td>WEIGHT &amp; BALANCE CHART</td>
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<td>OWNERS WEIGHT &amp; BALANCE RECORD</td>
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</tr>
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<td>EQUIPMENT LIST</td>
<td>.6-11</td>
</tr>
</tbody>
</table>

NOTE:

The empty weight, center of gravity, and equipment list for the airplane as delivered from Mooney Aircraft Corporation is contained in this section. The use of this section is valid for use with the airplane identified below when approved by Mooney Aircraft Corporation.

MOONEY - M20M

AIRCRAFT SERIAL NO._________________________________________

AIRCRAFT REGISTRATION NO._________________________________

Mooney Aircraft Corporation - Approval Signature & Date

ISSUED 6 - 89
This section describes the procedure for calculating loaded aircraft weight and moment for various flight operations. In addition, procedures are provided for calculating the empty weight and moment of the aircraft when the removal or addition of equipment results in changes to the empty weight and center of gravity. A comprehensive list of all Mooney equipment available for this airplane is included in this section. Only those items checked (X) were installed at Mooney and are included in the empty weight-and-balance data.

The aircraft owner and/or pilot, has the responsibility of properly loading the aircraft for safe flight. Data presented in this section will enable you to carry out this responsibility and insure that your airplane is loaded to operate within the prescribed weight and center-of-gravity limitations.

At the time of delivery, Mooney Aircraft Corporation provides the empty weight and center of gravity data for the computation of individual loadings. (The empty weight and C.G. (gear extended) as delivered from the factory is tabulated on page 6-5 when this manual is supplied with the aircraft from the factory.)

FAA regulations also require that any change in the original equipment affecting the empty weight and center of gravity be recorded in the Aircraft Log Book. A convenient form for maintaining a permanent record of all such changes is provided on page 6-5. This form, if properly maintained, will enable you to determine the current weight- and-balance status of the airplane for load scheduling. The weight-and-balance data entered as your aircraft left the factory, plus the record you maintain on page 6-5, is all of the data needed to compute loading schedules.

The maximum certificated gross weight for the Textron-Lycoming powered M20M is 3368 lbs (1528 Kg) for Takeoff and 3200 pounds (1452 Kgs) for Landing. Maximum useful load is determined by subtracting the corrected aircraft empty weight from its maximum gross weight. The aircraft must be operated strictly within the limits of the Center-of-Gravity Moment Envelope shown on page 6-7.

AIRPLANE WEIGHING PROCEDURE

(A) LEVELING: Place a spirit level on the leveling screws above the tailcone left access door when leveling the aircraft longitudinally. Level the aircraft by increasing or decreasing air pressure in the nose wheel tire.

(B) WEIGHING: To weigh the aircraft, select a level work area and:
1. Check for installation of all equipment as listed in the Weight & Balance Record Equipment List.
2. Top off both wing tanks with full fuel. Subtract usable fuel, 89.0 U.S. gals. (337 liters) @ 5.82 lb/gal(100LL)/(.69 Kg/l) = 518 lbs. (235 Kgs.), from total weight as weighed.

OPTIONAL METHOD - Ground aircraft and defuel tanks as follows:
a. Disconnect fuel line at fuel system union located forward of the firewall on the lower left hand side.
b. Connect a flexible line to output fitting that will reach fuel receptacle.
c. Turn fuel selector valve to tank to be drained; remove filler cap from fuel filler port.
## OWNERS WEIGHT AND BALANCE RECORD

Center below all weight change data from aircraft log book.

<table>
<thead>
<tr>
<th>AIRPLANE MODEL</th>
<th>M20M</th>
<th>SERIAL NUM.</th>
<th>FAA REG. NO.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>DATE</th>
<th>DESCRIPTION OF MODIFICATION</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>WEIGHT CHANGE</th>
<th>RUNNING EMPTY WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>WT. (LBS) (Kg)</td>
<td>ARM (INCHES) (cm)</td>
</tr>
</tbody>
</table>

BASIC EMPTY WEIGHT AS DELIVERED (WT) (Includes full oil - 10 Qts. (9.5 liters))

(Mult. inches by 25.4 or mm)  (Mult. inches by 2.54 for cm)  (Mult. pounds by .4536 for kg)
### PROBLEM FORM

<table>
<thead>
<tr>
<th>STEP</th>
<th>ITEM</th>
<th>SAMPLE PROBLEM</th>
<th>YOUR PROBLEM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>WEIGHT (Kg) Lbs</td>
<td>MOMENT/1000</td>
</tr>
<tr>
<td>1</td>
<td>AC Basic Empty Wt. (W)</td>
<td>(1009)</td>
<td>(114.6)</td>
</tr>
<tr>
<td></td>
<td>(Includes Full Oil) 10 Qts. (9.5 Li) @ 1.875 lbs/Qt. (.80 Kg/Li) (Sta. -20.19) (-51.3 cm)</td>
<td>2225</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Pilot Seat (#1)*</td>
<td>(77.1)</td>
<td>(7.64)</td>
</tr>
<tr>
<td></td>
<td>Co-Pilot Seat (#2)*</td>
<td>(77.1)</td>
<td>(6.66)</td>
</tr>
<tr>
<td>3</td>
<td>Left Rear Seat (#3) or Cargo Area</td>
<td>170</td>
<td>13.85</td>
</tr>
<tr>
<td></td>
<td>Right Rear Seat (#4) or Cargo Area</td>
<td>170</td>
<td>13.85</td>
</tr>
<tr>
<td>4</td>
<td>Fuel (Max. Usable - 89.0 Gal/534 Lbs) (337 Li/242 Kg) @ Sta. 49.23 (125 cm)</td>
<td>(164.7)</td>
<td>363</td>
</tr>
<tr>
<td></td>
<td>Baggage (Max. 120 Lbs (54.4 cm) @ Sta. 101.5 (257.8 cm))</td>
<td>(45.4)</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>Hat Rack (Max. 10 Lbs / 4.54 Kg) @ Sta. 131.0 (332.7 cm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Loaded AC Weight (Takeoff at Max. Weight)</td>
<td>(1528)</td>
<td>338</td>
</tr>
<tr>
<td></td>
<td>AC will have to burn off 168 lbs. fuel before normal landing is accomplished.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Required Fuel Burn-Off 28 Gals (105.9 Li) @ 6 Lbs./Gal.</td>
<td>(76.2)</td>
<td>168</td>
</tr>
<tr>
<td>8</td>
<td>Maximum Landing Weight of AC</td>
<td>(1454)</td>
<td>3200</td>
</tr>
</tbody>
</table>

Refer to Center of Gravity Moment Envelope, to determine whether your AC loading is acceptable.

9. **CAUTION** - DO NOT LAND AC WHEN OVER 3200 LBS EXCEPT IN AN EMERGENCY SITUATION.

* Obtain the moment/1000 value for each seat position (FWD, MID or AFT) from loading computation graph.

### CAUTION

Cargo loaded in rear seat area, with seat backs folded down, should have center of gravity over fuselage station 70.7.
M20M - CENTER OF GRAVITY MOMENT ENVELOPE

A/C WEIGHT (Kg) Lbs.

Center of Gravity Moment Envelope

LOAD AIRCRAFT MOMENT/1000-Kg-MM

A/C LOADED WITHIN THIS AREA ARE ABOVE NORMAL APPROVED LANDING WEIGHT. FUEL MUST BE BURNED-OFF PRIOR TO NORMAL LANDING.
M20M CENTER OF GRAVITY LIMITS

A/C WEIGHT
(Kg) Lbs.

0 105 110 115 120 125 130
AIRCRAFT CG LOCATION (Lcg) CM AFT OF DATUM (STA 0.0)

FORWARD LIMIT

3000

AFT LIMIT

2430

(907) 2000

(1000) 2200

(1100) 2400

(1200) 2600

(1300) 2800

(1400) 3100

(1452) 3200

(1500) 3300

(1528) 3368

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NOTE

A Donaldson D-1400 Filter Cleaner is also recommended. Do not use solvents.

f. Rinse filter element with a stream of clear water until rinse water is clear.

g. Dry filter thoroughly. Do not use a light bulb or air heated above 180°F for filter drying.

h. Inspect for damage and ruptures by holding light bulb inside filter. If damage is evident, replace filter with a new one.

GEAR & TIRE SERVICING

The aircraft is equipped with 6-ply Type III standard-brand tires and tubes. Keep the main gear tires inflated at 42 PSI and the nose tire at 49 PSI for maximum service life. Proper inflation will minimize tire wear and impact damage. Visually inspect the tires at preflight for cracks and ruptures, and avoid taxi speeds that require heavy braking or fast turns. Keep the gear and exposed gear retraction system components free of mud and ice to avert retraction interference and binding. It is recommended that retraction/extension cycles (5 minimum) be done any time any tire is replaced to assure that no interference exists during the cycle.

~ CAUTION ~

After any landing, other than a smooth touchdown and rollout, when aircraft is above 3200 Lbs (1452 Kg), the aircraft should undergo the Gear System Operational Inspection as outlined in M20M Service and Maintenance Manual, No. 150, Chapter 32-30-01.

The gear warning horn may be checked in flight by retarding the throttle with the gear up. The gear horn should sound with an intermittent note when throttle is positioned 114 to 318 inch from idle, while the gear is up.

BATTERY SERVICE

The two 24-volt, 10 ampere-hour electrical storage batteries are located in the tailcone, aft baggage compartment bulkhead, accessible through left and right side tailcone access panels. Check battery fluid level every 25 FLIGHT HOURS or each 30 DAYS whichever comes first.

To service the batteries, remove access cover and battery cover; check terminals and connectors for corrosion. Add distilled water to each battery cell as necessary; keep the fluid at one-quarter inch over the separator tops. Check the fluid specific gravity for a reading of 1.265 to 1.275. A recharge is necessary when the specific gravity is 1.240 or lower. Start charging at four amperes and finish at two amperes; do not allow battery temperature to rise above 120°F during recharging. Keep battery at full charge to prevent freezing in cold weather and to prolong service life.

~ CAUTION ~

Alternators and voltage regulators operate only as a one-polarity system. Be sure the polarity is correct when connecting a charger or booster battery.
If corrosion is present, flush the battery, shelf and mounting area with a solution of baking soda and water. Do not allow soda to enter the battery cells. Keep cable connections clean and tightly fastened, and keep overflow line free of obstruction.

**HYDRAULIC BRAKE RESERVOIR SYSTEM**

The brake system hydraulic reservoir is located on the tailcone bulkhead, forward of the avionics. To service, remove the left side tailcone access panel and check fluid level every 50 HOURS of operation. Fluid level should be no higher than two (2) inches(5 cm) below the filler cap. Use only hydraulic fluid (Red) conforming to specification MIL-H-5606. DO NOT FILL reservoir while parking brake is set.

**MAINTENANCE**

**ENGINE PERFORMANCE CHECKS**

When the aircraft leaves the factory the TEXTRON-Lycoming TIO-540-AF1A engine has been properly tuned and will perform at optimum efficiency. To insure that the engine is continuing to perform properly certain maintenance action should be performed during the 100 HOUR or ANNUAL inspection or whenever it is suspected that engine performance is not correct.

Refer to SERVICE AND MAINTENANCE MANUAL for specific maintenance actions to adjust engine if necessary.

**PROPELLER CARE**

The high stresses to which propeller blades are subjected makes their careful inspection and maintenance vitally important. Check the blades for nicks, cracks, or indications of other damage before each flight. Nicks tend to cause high stress concentrations in the blades which, if ignored, may result in cracks. It is very important that all nicks and scratches be repaired prior to next flight. It is not unusual for the propeller blades to have some end play or fore and aft movement as a result of manufacturing tolerances in the parts. This has no adverse effect on propeller performance or operation. With the first turn, centrifugal force firmly seats the blades, rigidly and positively against the retention bearing in the propeller hub.

Preflight inspection of the propeller blades should include, in addition to the foregoing, an occasional wiping with an cloth soaked in kerosene. NEVER USE AN ALKALINE CLEANER ON THE BLADES.

Your Mooney Service Center will answer any questions you may have concerning blade repair and inspection.

**EXTERIOR CARE**

As with any paint applied to a metal surface, an initial curing period is necessary for developing the desired qualities of durability and appearance. Therefore, DO NOT APPLY WAX TO THE NEW AIRCRAFT EXTERIOR UNTIL TWO OR THREE MONTHS AFTER DELIVERY. Wax substances will seal paint from the air and prevent curing. Wash the exterior to prevent dirt from working into the curing paint. Hold buffing to a minimum until curing is complete and there is no danger of disturbing the undercoat.